

Claims

1. A disk drive comprising: access means accessing a disk which is rotationally driven; an interface circuit connected to said access means and interfaced with an outside; and a microcomputer which controls an operation of said access means and which is connected to said interface circuit,
said microcomputer including one semiconductor substrate having an electrically erasable and programmable nonvolatile semiconductor memory and a central processing unit which accesses said nonvolatile semiconductor memory,
said nonvolatile semiconductor memory having a reboot program area and an application program area in its memory area,
said application program area having an area which stores an application program to be executed by said central processing unit to control said access means and said interface circuit,
20 said reboot program area having an area which stores a reboot program which causes said central processing unit to execute processing for rewriting said application program area,
said central processing unit executing said reboot program to rewrite said application program

area in whole or part, in response to a rewrite command for said application program area which is supplied to said interface circuit from the outside, or executing said application program stored in said 5 application program area to control said access means and said interface circuit, in response to a disk access command supplied to said interface circuit from the outside.

2. A disk drive according to claim 1, wherein said 10 reboot program includes an input control program, a rewrite control program and a transfer control program,

15 said central processing unit which responds to the rewrite command providing control to execute said input control program and fetch said application program which is, in whole or part, supplied to said interface circuit from the outside, execute said transfer control program and transfer said rewrite control program from said reboot program area to a 20 built-in RAM of said microcomputer, and execute said rewrite control program transferred to said built-in RAM and write said application program fetched in whole or part, into said application program area.

25 3. A disk drive according to claim 1, wherein said reboot program includes an input control program and a

transfer control program,

5 said central processing unit which responds to the rewrite command providing control to execute said input control program and fetch said write control program and said application program which is, in whole or part, supplied to said interface circuit from the outside, execute said transfer control program and transfer said fetched rewrite control program to a built-in RAM of said microcomputer, and execute said 10 rewrite control program transferred to said built-in RAM and write said application program fetched in whole or part, into said application program area.

4. A disk drive according to claim 2 or 3, wherein said reboot program further includes an area which 15 stores a vector table and a reset processing program,

 said central processing unit, in response to a reset instruction, proceeding to execution of said reset processing program by referring to said vector table, and, during the execution of said reset 20 processing program, determining whether said central processing unit is in a forced reboot state capable of responding to the rewrite command; when in the forced reboot state, said central processing unit proceeding to execution of said reboot program after receiving an 25 input of the rewrite command; when not in the forced

reboot state, said central processing unit proceeding to a state of being able to execute said application program stored in said application program area.

5. A disk drive according to claim 2 or 3, wherein
5 said application program area further includes in a memory area thereof a sum storing area which stores a sum of information held in another memory area,

10 said reboot program area further having an area which stores a vector table and a reset processing program,

15 said central processing unit, in response to a reset instruction, proceeding to execution of said reset processing program by referring to said vector table, and, during the execution of said reset processing program, determining whether said central processing unit is in a forced reboot state capable of responding to the rewrite command; when in the forced reboot state, said central processing unit proceeding to execution of said reboot program after receiving an
20 input of the rewrite command; when not in the forced reboot state, said central processing unit determining whether the sum stored in said sum storing area coincides with a sum of the information held in said other memory area; if it is not determined that both
25 sums coincide with each other, said central processing

unit proceeding to execution of said reboot program after receiving an input of the rewrite command; if it is determined that both sums coincide with each other, said central processing unit proceeding to a state of 5 being able to execute said application program stored in said application program area.

6. A disk drive according to claim 1, wherein said nonvolatile semiconductor memory is a flash memory having a plurality of memory blocks each of which 10 constitutes a collectively erasable unit, said reboot program area and said application program area being assigned to mutually different memory blocks.

7. A disk drive according to claim 1, wherein said reboot program area holds a program written in a process of manufacturing said microcomputer. 15

8. A disk drive according to claim 1, further comprising means for inhibiting rewrite of said reboot program area.

9. A disk drive according to claim 1, wherein said 20 interface circuit has ATAPI interface specifications.

10. A computer comprising: a main board including a microprocessor and a peripheral interface controller which are connected to a bus; and a disk drive according to claim 1, said disk drive being connected 25 to said peripheral interface controller via said

interface circuit included in said disk drive.

11. A computer comprising: a main board including a microprocessor and an IDE interface controller which are connected to a PCI bus; and a disk drive according to claim 9, said disk drive being connected to said IDE interface controller via said interface circuit included in said disk drive.

12. A computer according to claim 11, wherein said main board and said disk drive are incorporated in one case.

13. A computer comprising: a main board including a microprocessor and a peripheral interface controller which are connected to a bus; and a disk drive connected to said peripheral interface controller, said main board and said disk drive being incorporated in one case,

20 said disk drive including reproducing means reading and reproducing recorded information from a disk which is rotationally driven, an interface circuit which outputs information reproduced by said reproducing means to said peripheral interface controller and also receives information supplied via said peripheral interface controller, and a microcomputer connected to said reproducing means and said interface circuit,

said microcomputer including one semiconductor substrate having a central processing unit and an electrically erasable and programmable nonvolatile semiconductor memory,

5 said nonvolatile semiconductor memory having a reboot program area and an application program area in its memory area,

 said application program area having an area which stores an application program to be executed by
10 said central processing unit to control said reproducing means and said interface circuit,

 said reboot program area having an area which stores a reboot program which causes said central processing unit to execute processing for rewriting
15 said application program area,

 said central processing unit executing said reboot program to rewrite said application program area in whole or part, in response to a rewrite command for said application program area which is
20 supplied to said interface circuit via said peripheral interface controller, or executing said application program to control said reproducing means and said interface circuit, in response to a disk access command supplied to said interface circuit via said
25 peripheral interface controller.

14. A computer comprising: a PC board including a microprocessor and an IDE interface controller which are connected to a PCI bus; and a disk drive connected to said IDE interface controller, said PC board and 5 said disk drive being incorporated in one case,

 said disk drive including: access means accessing a disk which is rotationally driven; an ATAPI interface circuit connected to said access means and connected to said IDE interface controller; and a 10 microcomputer which controls an operation of said access means and which is connected to said ATAPI interface circuit,

 said microcomputer including one semiconductor substrate having an electrically erasable and 15 programmable nonvolatile semiconductor memory and a central processing unit which executes a program stored in said nonvolatile semiconductor memory,

 said nonvolatile semiconductor memory having a reboot program area and an application program area in 20 its memory area,

 said application program area having an area which stores an application program to be executed by said central processing unit to control said access means and said ATAPI interface circuit,

25 said reboot program area having an area which

stores a vector table, a reset processing program and a reboot program which causes said central processing unit to execute processing for rewriting said application program area in whole or part,

5 said central processing unit, in response to a reset instruction, proceeding to execution of said reset processing program by referring to said vector table, and, during the execution of said reset processing program, determining whether said central
10 processing unit is in a forced reboot state capable of responding to a rewrite command for said application program area which is supplied to said ATAPI interface circuit via said IDE interface controller; when in the forced reboot state, said central processing unit
15 proceeding to execution of said reboot program after receiving an input of the rewrite command; when not in the forced reboot state, said central processing unit proceeding to a state of being able to execute said application program stored in said application program
20 area.

15. A computer comprising: a PC board including a microprocessor and an IDE interface controller which are connected to a bus; and a disk drive connected to said IDE interface controller, said PC board and said
25 disk drive being incorporated in one case,

5 said disk drive including: access means accessing a disk which is rotationally driven; an ATAPI interface circuit connected to said access means and connected to said IDE interface controller; and a microcomputer which controls an operation of said access means and which is connected to said ATAPI interface circuit,

10 said microcomputer including one semiconductor substrate having an electrically erasable and programmable nonvolatile semiconductor memory and a central processing unit which executes a program stored in said nonvolatile semiconductor memory,

15 said nonvolatile semiconductor memory having a reboot program area and an application program area in its memory area,

20 said application program area having an area which stores an application program to be executed by said central processing unit to control said access means and said ATAPI interface circuit, said application program area having in a memory area thereof a sum storing area which stores a sum of information held in another memory area,

25 said reboot program area having an area which stores a vector table, a reset processing program and a reboot program which causes said central processing

unit to execute processing for rewriting said application program area in whole or part,

 said central processing unit, in response to a reset instruction, proceeding to execution of said

5 reset processing program by referring to said vector table, and, during the execution of said reset processing program, determining whether said central processing unit is in a forced reboot state capable of responding to a rewrite command for said application

10 program area which is supplied to said ATAPI interface circuit via said IDE interface controller; when in the forced reboot state, said central processing unit proceeding to execution of said reboot program after receiving an input of the rewrite command; when not in

15 the forced reboot state, said central processing unit determining whether the sum stored in said sum storing area coincides with a sum of the information held in said other memory area; if it is not determined that both sums coincide with each other, said central

20 processing unit proceeding to execution of said reboot program after receiving an input of the rewrite command; if it is determined that both sums coincide with each other, said central processing unit proceeding to a state of being able to execute the

25 application program stored in said application program

area.

16. A disk drive comprising: reproducing means reading and reproducing recorded information from a disk which is rotationally driven; an interface circuit which is interfaced with a host connected to said reproducing means; and a microcomputer which controls an operation of said reproducing means and which is connected to said interface circuit,
 - 10 said microcomputer including a central processing unit and an electrically erasable and programmable nonvolatile semiconductor memory,
 - 15 said nonvolatile semiconductor memory having an application program area which stores a program for controlling a reproducing operation of said reproducing means and an operation of said interface circuit, and a reboot program area in which rewriting of stored information is inhibited,
 - 20 said central processing unit executing a program of said reboot program in response to a reset instruction, and determining whether said central processing unit is in a forced reboot state capable of responding to a rewrite command for said application program area, which is issued from said host; when in the forced reboot state, said central processing unit,
 - 25 after receiving an input of the rewrite command,

providing control to rewrite said application program area, in whole or part, with a program supplied to said interface circuit after the input of the rewrite command; when not in the forced reboot state, said 5 central processing unit proceeding to a state of being able to execute the program stored in said application program area.

17. A disk drive comprising: reproducing means reading and reproducing recorded information from a 10 disk which is rotationally driven; an interface circuit which is interfaced with a host connected to said reproducing means; and a microcomputer which controls an operation of said reproducing means and which is connected to said interface circuit, 15 said microcomputer including a central processing unit and an electrically erasable and programmable nonvolatile semiconductor memory, said nonvolatile semiconductor memory having an application program area which stores a program for 20 controlling a reproducing operation of said reproducing means and an operation of said interface circuit, and a reboot program area in which rewriting of stored information is inhibited, said application program area having in a memory area thereof a sum 25 storing area which stores a sum of information held in

another memory area,

5 said reboot program area having an area which stores a vector table, a reset processing program and a reboot program which causes said central processing unit to execute processing for rewriting said application program area in whole or part,

10 said central processing unit, in response to a reset instruction, executing a program stored in said reboot program area and determining whether said central processing unit is in a forced reboot state capable of responding to a rewrite command for said application program area which is issued from said host; when in the forced reboot state, said central processing unit, after receiving an input of the rewrite command, providing control to rewrite said application program area, in whole or part, with a program supplied to said interface circuit after the input of the rewrite command; when not in the forced reboot state, said central processing unit determining 20 whether the sum stored in said sum storing area coincides with a sum of the information held in said other memory area; if it is not determined that both sums coincide with each other, said central processing unit, after receiving an input of the rewrite command, 25 providing control to rewrite said application program

area, in whole or part, with a program supplied to said interface circuit after the input of the rewrite command; if it is determined that both sums coincide with each other, said central processing unit

5 proceeding to a state of being able to execute the program stored in said application program area.

18. A disk drive according to claim 16 or 17, wherein said nonvolatile semiconductor memory is a flash memory having a plurality of memory blocks each of

10 which constitutes a collectively erasable unit, said reboot program area and said application program area being assigned to mutually different memory blocks.

19. A disk drive according to claim 18, wherein said reboot program area holds a program written in a process of manufacturing said microcomputer.

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20. A computer comprising: a main board including a microprocessor and a peripheral interface controller which are connected to a bus; and a disk drive according to claim 16 or 17, said main board and said

20 disk drive being incorporated in one case, said disk drive being connected to said peripheral interface controller via said interface circuit included in said disk drive.